Operating Manual

TF10PP-640

Coupling Filter for Phase to Phase Fault Location with Vloc Pro cable locator system

Mess- und Ortungstechnik
Measuring and Locating Technologies

Elektrizitätsnetze
Power Networks

Kommunikationsnetze
Communication Networks

Rohrleitungsnetze
Water Networks

Leitungsortung
Line Locating

Issue: SebaKMTUK06101201

Consultation with SebaKMT

The present manual has been designed as an operating guide and for reference. It is meant to answer your questions and solve your problems in as fast and easy a way as possible. Please start with referring to this manual should any trouble occur.

In doing so, make use of the table of contents and read the relevant paragraph with great attention. Furthermore, check all terminals and connections of the instruments involved.

Should any question remain unanswered, please contact:

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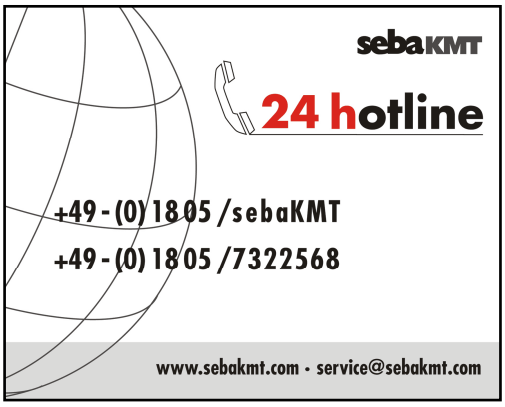

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SebaKMT warrant that at the time of delivery SebaKMT products are free from manufacturing or material defects which might considerably reduce their value or usability. This warranty does not apply to faults in the software supplied. During the period of warranty, SebaKMT agree to repair faulty parts or replace them with new parts or parts as new (with the same usability and life as new parts) according to their choice.

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All warranty claims versus SebaKMT are hereby limited to a period of 12 months from the date of delivery. Each component supplied by SebaKMT within the context of warranty will also be covered by this warranty for the remaining period of time but for 90 days at least.

Each measure to remedy a claim under warranty shall exclusively be carried out by SebaKMT or an authorized service station.

To register a claim under the provisions of this warranty, the customer has to complain about the defect, in case of an immediately detectable fault within 10 days from the date of delivery.

This warranty does not apply to any fault or damage caused by exposing a product to conditions not in accordance with this specification, by storing, transporting, or using it improperly, or having it serviced or installed by a workshop not authorized by SebaKMT. All responsibility is disclaimed for damage due to wear, will of God, or connection to foreign components.

For damage resulting from a violation of their duty to repair or re-supply items, SebaKMT can be made liable only in case of severe negligence or intention. Any liability for slight negligence is disclaimed.

Table of Contents

1 Safety Advice 5
1.1 General Notes 5
1.2 General Cautions and Warnings 6

2 Technical Data 7

3 Scope of Delivery 8

4 Connection 9

5 Application 10

6 Twisted field method for detecting phase to phase faults 11

7 Procedure for phase to phase fault location using the Vloc Pro Transmitter & TF10-PP-640, and Vloc Pro receiver 13

8 Troubleshooting failure of signal and fuses 15

9 Connection to LV Mains live 16

10 Photographic example of connection to LV Link Box 17

11 Disposal of old equipment 18

1 Safety Advice

1.1 General Notes

Safety precautions

This manual contains basic advice for the installation and operation of the product. It is essential to make this manual accessible to the authorised and skilled operator. He needs to read this manual closely. The manufacturer is not liable for damage to material or humans due to non-observance of the instructions and safety advices provided by this manual.

Setting up and operating the system may only be done by authorised and skilled personnel. According to DIN VDE 0104 (EN 50191) and DIN VDE 0105 (EN 50110) as well as the accident prevention regulation (Unfallverhütungsvorschrift UVV), skilled personnel is defined as a person who is qualified to work, judge and realize dangers due to his professional education, knowledge and experience and his knowledge of applicable regulations. Locally applying regulations have to be observed.

Symbols used in this manual

Important instructions concerning the protection of staff and equipment as well as technical safety within this document are labelled with one of the following symbols:

Symbol	Description
WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Notes have important information and useful tips on the operation of your equipment. Non-observance may result in useless measurement results.

Working with equipment of Seba KMT

All electrical regulations of the country where the system is operated have to be observed as well as national regulations for prevention of accidents and existing regulations for the safety and operation of equipment of the involved companies.

After working with the equipment, make sure to de-energise, protect against re-energising, discharge, ground and short-circuit the instrument and installations that have been worked on.

Original accessories ensure safe operation of the equipment. It is not allowed and the warranty is lost if other accessories than the original ones are used with the equipment.

Operating personal

Only trained and/or instructed staff is permitted to deal with this system and its peripherals. Keep any other person away from it.

Only authorised persons with sufficient expertise are allowed to operate the device.

Repair and maintenance

Repairs and service must only be done by SebaKMT or authorised service departments of SebaKMT. SebaKMT recommends having the equipment serviced and checked once per year at a SebaKMT service location. For SebaKMT on-site support please contact our service office for more information.

1.2 General Cautions and Warnings

Intended application

Safe operation is only realised when using the equipment for its intended purpose. Using the equipment for other purposes may lead to human danger and damage of equipment of involved installations.

The limits described under technical data may not be exceeded. Operating products of SebaKMT in condensing environment may lead to flash-over, danger and damage. The instruments should only be operated under tempered conditions. It is not allowed to operate SebaKMT products at direct contact with humidity, water or near aggressive chemicals nor explosive gases and fumes.

Behaviour at malfunction of normal operation

The equipment may only be used when working properly. When irregularities or malfunctions appear that cannot be solved consulting this manual, the equipment must immediately be put out of operation and marked as not functional. In this case inform the person in charge who should inform the SebaKMT service to resolve the problem. The instrument may only be operated when the malfunction is resolved.

Operation in traffic environment

To ensure safety for operators and traffic, the country-specific regulations must be observed.

Fire fighting in electrical installations

- Recommended extinguishing agent: carbon dioxide (CO2)
- Carbon dioxide is electrically non conductive and does not leave residue. It is safe to use in energized facilities as long as the minimum distances are observed.
- It is essential to observe the safety instruction on the extinguishing agent.
- Applicable is DIN VDE 0132.

Dangers when operating with HV

Special attention and safety-conscious behaviour is needed when operating HV facilities and especially non-stationary equipment. The regulations VDE 0104 about setting up and operation of electric test equipment, i.e. the corresponding EN 50191 as well as country-specific regulations and standards must be observed.

- Safety installations may not be by-passed nor deactivated.
- Operation requires minimum two people whereas the second person must be able to activate the emergency stop in case of danger.
- To avoid hazardous electric charges of metallic parts in the vicinity, all metallic parts must be grounded.
- The equipment and all accessories must be connected according to applicable standards VDE, EN or DIN as well as country-specific regulations.

2 Technical Data

Pos.	Item	Value
1.	Voltage withstand at output	max. 100 V (+ 5%)
2.	External voltage warning	> 24 V ac
3.	Input power	max. 10 W
4.	Frequency range	480 Hz … 10 kHz
5.	Fuse value (internal fuses)	Input 3.15 A slow Output 8.0 A slow (6.3 x 32 mm US-standard)
6.	Fuse value (Test Leads)	15A
7.	Height	170 mm
8.	Width	250 mm
9.	Depth	120 mm
10.	Weight	2.1 kg
11.	IP-Protection according to EN 60529	IP 54
12.	Protection class according to DIN VDE 014 Part 1	CAT IV 600V

3 Scope of Delivery

- TF10PP-640 Coupling Filter for Phase to Phase fault location with Audio Frequency Generators
- Carrying strap (short)
- Set of connecting cables VL TF 10
  consisting of :
  Fused alligator connecting clip (red, 10 A, 600 V, 50 kA)
  Fused alligator connecting clip (black, 10 A, 600 V, 50 kA)
  Alligator clip (green / yellow)
  Connecting lead for protective earth (green / yellow, 2 m)

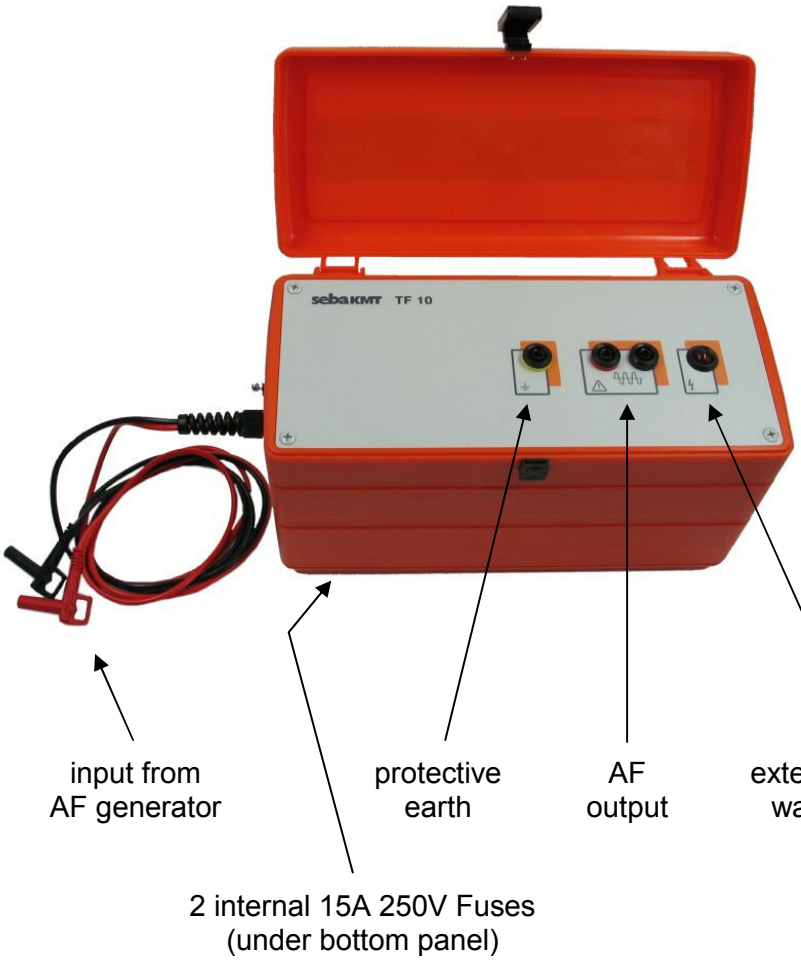
4 Connection

WARNING

Always connect the protective earth before making any other connection and take the protective earth off after all other connections have been taken off.

WARNING

Observe all safety regulations when handling energised LV !

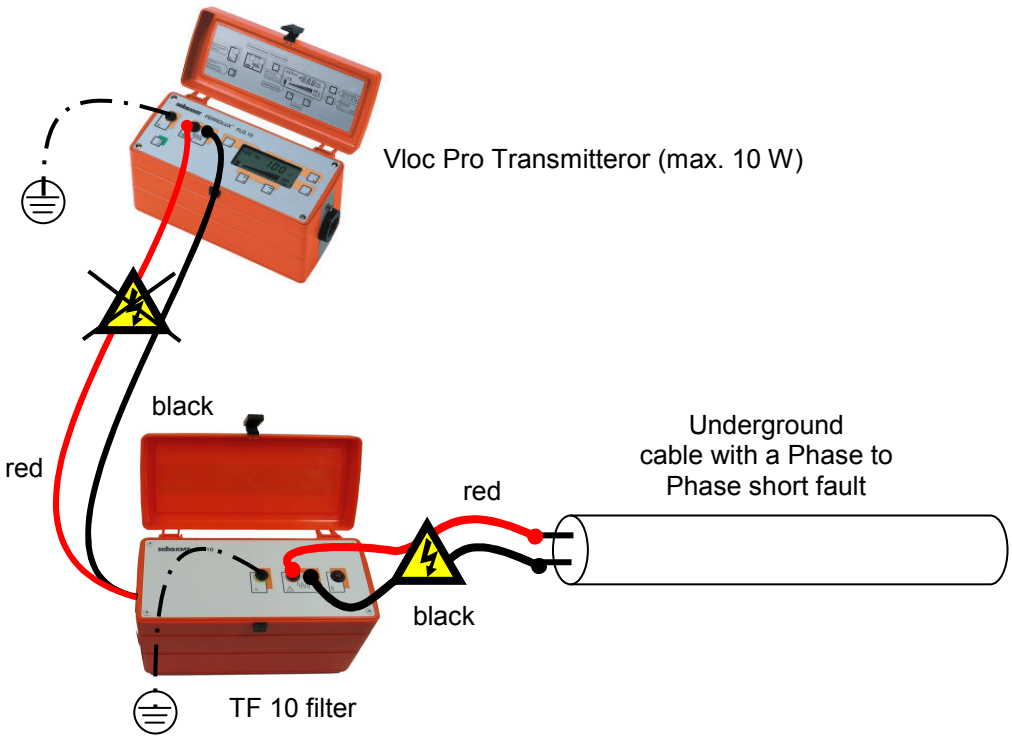


5 Application

The TF 10-PP-640 filter allows the pinpointing of low impedance (Short Circuit) Phase to Phase LV (Low Voltage) cable faults in combination with an audio frequency cable locator receiver and transmitter. The TF10PP-640 will allow a connected audio frequency generator to feed its signal through the TF10PP filter onto an energised pair of faulty phases of an LV cable. The maximum output power of the audio frequency generator may not exceed 10 W. The TF10PP-640 is designed for maximum efficiency to transmit current into a phase to phase fault; some phase to phase faults are not hard short circuit or are some distance away, so voltage may be present on the faulty pair. The residual or induced voltage on a faulty pair of phases rarely exceeds 20V; the TF10PP-640 will block ac voltage up to 100V.

The TF10PP may also be applied to other cables like de-energised medium voltage cables or communication cables to protect the AF generator from external voltage induced on the target cable up to 100V.

The fuses inside the bottom cover protect the instrument against voltage input from the AF generator side and against overload.



When connecting phase-to-phase the full current will return via the fault within the same cable. This creates a magnetic field for the "Twisted-Field-Method".

Please note that the output indications of the AF generator do not coincide with the output of the TF10PP-640 (i.e. indicated output current of AF generator is unequal to output current of TF10PP-640). Maximum output current values are reached at frequencies 640 Hz ... 10 kHz. Output current at lower frequencies is drastically reduced.

6 Twisted Field Method for detecting phase to phase faults

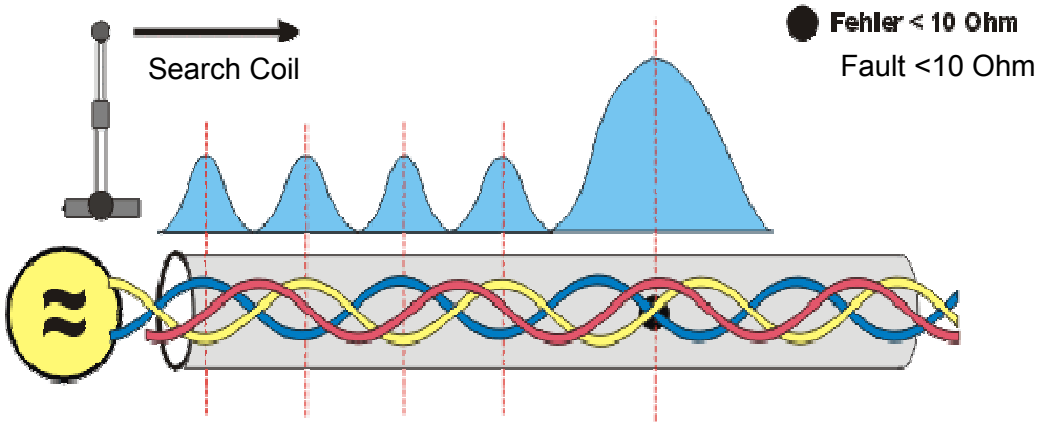
This method has been used for many years and is generally well known. It was developed in the 1940s in the UK and the method became known as the “Bimec” method at that time.

The Vloc Pro Phase to Phase fault location system uses the 10 Watt Vloc Pro transmitter feeding through the SebaKMT TF10PP-640 filter unit. The filter can be connected with insulated fused connecting leads to live LV systems, and can withstand up to 100V ac for locating and fault location. If the voltage present between the faulty phases is above 20V, or the fault impedance above 10 Ohms the success of this technique may be limited.

For phase to phase fault location, the system is connected across the two cores of the cable that are shorted at the fault.

The twisted field effect is followed using the Vloc pro locator. The twisted field effect will be present along the cable up to the fault. If the fault is on a cable branch, the twisted field effect will follow the branch and leave the main cable.

For verification before digging, it is advised the result may be confirmed by repeating the fault location process from the other end of the cable.



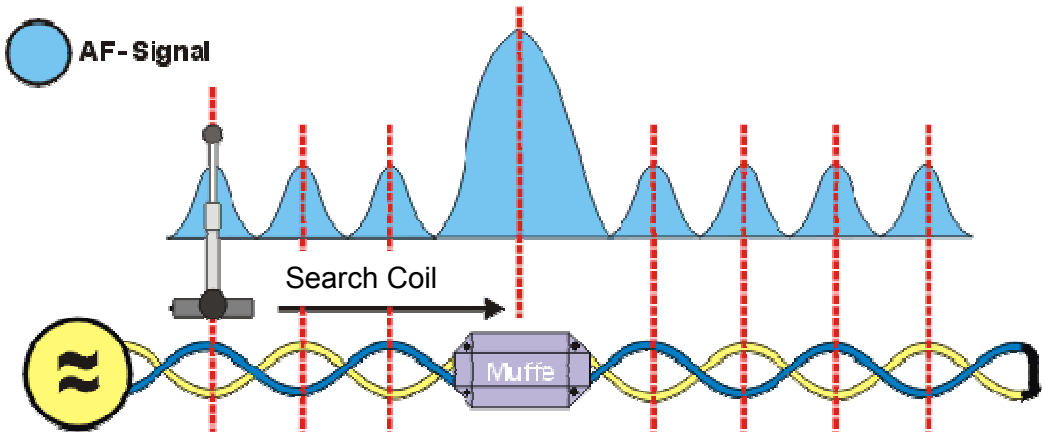
The twisted field method detects the resultant magnetic field caused by two close together twisted conductors.

When the conductors are side by side, the resultant field on the ground surface is at minimum; but when the two conductors are above and below, the resultant field is at maximum.

The twist built in during the cable manufacturing process results in the rise and fall of signal along the cable. When the locator is carried along the cable at a brisk walking pace, the cable twist effect will be seen at exactly regular intervals until the fault position is reached, when the signal strength will change significantly.

The actual change at the fault will be dependent on the position of the phase to phase short within the cable; it may be shown as a maximum or just stop, but in any case the twist effect will be absent after the fault.

If a cable joint is on the fault location route, this will result in a signal that may remain the same, or change dramatically for one or two paces, and the regular pattern will resume unless the fault is in the cable joint or on a branch taken off the cable joint.



In all cases, before starting fault location, it is important that the operator is familiar with network conditions and layout.

Before starting to use this equipment on live systems the operator must be understand and carry out company safety procedures.

7 Procedure for phase to phase fault location using Vloc Pro TX and TF10PP-640 and Vloc Pro Receiver

Prior to connecting the equipment and operating it to search for the fault, the cable route main and branches must be understood, traced and marked, including sudden cable depth changes up and down. For this method to work efficiently, the route must be followed at a consistent and brisk walking pace, necessitating confidence in the route.

Before starting to use this equipment on live systems the operator must understand and carry out company safety procedures for working on live systems.

Connecting the TF10PP-640 and Vloc Pro transmitter

1. Connect the flying leads from the TF10PP to the Vloc Pro TX transmitter.

2. Ground the TF10PP-640 to the station ground or the link box ground depending on application. Using the earth lead via the protective earth connection point.

3. Plug in the fused leads to the TF10PP-640 and short the ends together

4. Switch on the Vloc Pro TX and press the F key until 640 Hz frequency is selected. Switch off the TX.

5. Observing your company safety instructions, connect the fused leads' clips to the faulty phases.

6 Switch on the Vloc Pro TX.

7 Using the +/- keys, increase Vloc Pro TX power output until output signal of about 6-700mA or more is displayed. Note that the output current displayed on the Vloc Pro TX does not correspond to the actual TF10PP-640 output, which may be higher.

Using the Vloc Pro receiver.

1. Prior to this procedure, use the Vloc Pro receiver to accurately trace and mark the cable route. This may be done using the signal clamp with the transmitter, or using the 50Hz power mode.

2. Switch on the Vloc Pro receiver. Repeatedly press the F key until frequency is set to 640Hz.

3. Press the antenna /enter key until either peak mode or broad mode is selected.
4. Hold the receiver at your side, and place it above the known route of the faulty cable. Hold it so that it's handle is above and perpendicular to the cable, that is 90 degrees twisted from the normal cable tracing orientation.

5. Walk along the cable route for a few metres to ensure that a rising and falling signal is available.

6. Adjust the receiver gain using the blue + or - keys so that the bargraph on the screen is filled at maximum signal and almost empty at minimum signal.

7. Keeping the Vloc Pro receiver handle across the marked cable route, walk along the route, observing the rising and falling signal.

8. Follow this rising and falling signal and mark the position where it stops.

9. If possible, repeat the whole process from the other end of the cable to confirm the fault position.

8 If there seems to be no cable lay effect, check output connections then the fuses in the fused leads and the fuses in the base of the TF10-PP-640.

If no multi-meter is available to check the 10A fuses in the fuse-holder of the fused leads, note that operator can use the built in multi-meter function in the Vloc Pro transmitter.

Disconnect the leads from the filter and connect them via the adapter lead to Vloc Transmitter. Short the fused ends of the fused leads together. Press the (i) key on the transmitter display shows Ohms to measure the leads. If correct and functioning, the Ohms display will show (0). If open due to a blown fuse ohms will show (999).

This simple test above confirms that the fused leads will pass current.

To confirm TF10-PP-640 blocking filter has current output, connect the filter to the Vloc Pro transmitter. Then connect the fused leads to the TF10-PP-640 blocking filter and short circuit the ends of the fused leads after arranging them in a loop. Switch on the Vloc pro receiver and set frequency to 640Hz, set power output to 2 steps. Use the Vloc Pro receiver to detect the signal from the loop. Set antenna mode to peak and the gain to between 25 and 30.

Wave the Vloc Pro receiver across the loop formed by the fused leads; the signal will be strong. There will also be some signal radiated by the TF10-PP-640 filter. The signal will also be strong when the blade is across the cable.

If there is no current on the cable loop, check both of the fuses in the TF10-PP. There are 2 15A 250V fuses in fuseholders mounted under the base cover of the TF10-PP-640

9 Using the Vloc Pro TX for cable locating purposes on live LV mains.

The live mains plug connector assembly is provided as an optional extra accessory with some phase to phase kits. It allows the Vloc Pro TX to be connected vis the live mains plug connector to a live mains socket in a building.

The TF2-M may be used with the mains plug connector assembly, and powered by the HPL10 transmitter, but output power should be limited to 2 watts.

The mains plug connector assembly should not be used with the TF10PP on live systems as the 100V maximum voltage rating of the TF10PP may be exceeded.

10

Note; Grounding connection not clearly shown on the photos.

10 Disposal of Old Equipment

If the SebaKMT products reach the end of the life span, they should be short-circuited and environmentally friendly disposed or recycled.

We are pleased to help you finding the environmentally friendly way. Please contact sales@sebakmt.com.